

# TRANSLATION OF DECLARATION

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Osamu Munekata et al

Application No.: Serial No. 10/166,129

Art Unit: 1742

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Examiner: Sikyin Ip

Title: LEAD-FREE SOLDER ALLOY

### DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents  
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Further to the declaration of April 15, 2005, I, Eietsu Hasegawa, declare as follows.

1. As I stated in the declaration of April 15, 2005 concerning the present patent application, I am one of the Directors of Senju Metal Industry Company, Ltd. (referred to below simply as "Senju Metal"), which is the assignee of the present invention. I am in charge of the sales department and manage the overall sales of solder products. Accordingly, as part of my work, I am very familiar with sales figures for the

lead-free solder products of Senju Metal.

2. As I stated in the earlier declaration, Senju Metal began selling a Sn-Cu-Ni-P alloy described by claims 13 - 15 of this patent application in September 2003. This alloy was extremely well received, so we began the sales of that alloy. At present, we sell two different types of Sn-Cu-Ni-P alloys for preforms and bar solder. At first, such alloys were sold in the form of solder preforms for reflow soldering, but now they are sold not only as solder preforms but also as bar solder for use in wave soldering.

3. Each of these products has sold remarkably well. The attached Figure 1 is a graph showing the annual sales for these products in Japanese yen and in dollars from September 2003 through June 2007. The sales figures in dollars were calculated using an exchange rate of 120 yen per \$1, which is the approximate rate in June 2007.

From Figure 1, it can be seen that we began to see explosive growth of bar solder according to the present invention in 2005. In addition, sales of solder preforms began to rapidly increase in 2006. These sales figures are particularly impressive not only for their size but also, as shown in the graph, for their continued growth. It is not possible to predict the total sales for these products for 2007. This is because sales are not necessarily made at a steady rate. It is significant that sales

for solder preforms according to the present invention have already exceeded the total sales for the same product for all of 2006.

4. The following Table 1 explains the sales of these products as a proportion (%) of total sales by Senju Metal for bar solder and solder preforms, respectively. The strength of the solder preforms according to the present invention as a new product is particularly striking. Senju Metal sells over 40 varieties of solder preforms, but comparing the most recent sales figures (from January to June 2007), solder preforms according to the present invention in fact represent over 8% of all sales of Senju Metal's solder preforms.

Table 1

Annual sales for solder preforms and bar solder  
of the present invention

Year	Solder preforms		Bar solder	
	Sales (\$)	Proportion of all products of this type (%)	Sales (\$)	Proportion of all products of this type (%)
2003	10,167	0.25	0	0
2004	45,746	1.09	15,083	0.02
2005	64,118	1.44	543,925	0.77
2006	210,918	3.75	1,272,297	1.08
2007 (Jan - June)	270,319	8.18	552,906	0.84

5. Our company is not doing any special advertising for either of these products. Senju Metal runs general advertisements for all of its products in the magazine "Jisso Gijutsu" (Mounting Technology) to encourage orders from potential new customers. However, those advertisements do not specifically deal with either of the alloys according to the present invention. Therefore, the excellent sales of these products as described above are not due to advertisements.

6. Senju Metal has approximately 50 salesmen in its sales department. These salesmen carry out sales of the solders according to the present invention in the same manner as for other products of Senju Metal, and they are not putting any particular emphasis on either of these products.

7. Senju Metal has an English language web site and a Japanese language web site. On the home pages, the solder products of the present invention are introduced as just one of 20 different types of lead-free solder products, and no particular emphasis is made with respect to these products. Therefore, I do not think that the internet has had any effects on sales of these products.

8. To our customers, an important feature of these products is that even though they have wettability which is comparable to that of conventional Sn-Ag-Cu solders, they are less expensive than Sn-Ag-Cu solders because they do not contain any of the

expensive element Ag. The closest competitive product to these products is a Sn-Cu-Ni-Ge alloy manufactured by another Japanese company. A Sn-Cu-Ni-P alloy according to the present invention has lower material costs than a Sn-Cu-Ni-Ge alloy because P is much cheaper than Ge. However, because the products of our company are highly rated, we are able to sell the products at substantially the same price as the competitive Sn-Cu-Ni-Ge alloy. In this manner, the excellent commercial success of these products according to the present invention is not due to a lower price than competitive products.

9. Ge is not only expensive as an alloying element, but it has the drawbacks that it increases the melting point of an alloy, that it causes bridging of solder between soldered joints when it is used for flow soldering, and the like. Therefore, a Sn-Cu-Ni-P alloy according to the present invention has particularly excellent advantages over a Sn-Cu-Ni-Ge alloy, so it is likely that a Sn-Cu-Ni-P alloy according to the present invention will become the industry standard as a replacement for Sn-Ag alloys or Sn-Ag-Cu alloys.

10. The solders according to the present invention were initially used primarily for reflow soldering of electronic parts to printed circuit boards for automobiles. However, because of their excellent properties, the uses for these products are expanding with certainty. Today, they are employed for uses such as the following.

- a. Electronic parts for automobiles
- b. Industrial machinery
- c. Household appliances
- d. Electronic parts

From this fact as well, it can be seen that the alloys according to the present invention are being widely used for soldering of electronic parts.

11. As stated above, an important application of the solders according to the present invention is in the Japanese automotive industry. For example, Denso Corporation, which is one of the major suppliers of automotive parts in the world, is employing solder preforms according to the present invention for soldering of electronic parts in the Toyota Prius. The Japanese automotive industry is famous for making particularly strict demands concerning performance. Therefore, advertising and sales efforts by our company would not be sufficient to gain the acceptance of our products by the automotive industry. The excellent sales record for these products is due to the quality of these products.

12. In summary, in my opinion, the outstanding sales figures for solders according to the present invention is definitely due to the excellent properties of these alloys. In light of the excellent properties of these alloys and the clear advantages of these alloys with respect to cost compared to Ag-containing alloys or Ge-containing alloys, in my opinion, if an

alloy according to the present invention was easy to invent, it would have been invented and sold for use in soldering of electronic parts long before the present invention. Therefore, the excellent sales for these products is strong support of an inventive step.

13. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Senju Metal Industry Co., Ltd.

July 25, 2007 .

Eietsu Hasegawa

(Date)

(Signature)